

IN THE SPECIFICATION:

At page 1, prior to line 1, please insert a new heading and text as follows:

--CROSS-REFERENCE TO RELATED APPLICATION

Priority is claimed from Japanese patent application 2002-342456 filed November 26, 2002.--

The paragraph beginning at page 1, line 7 has been amended as follows:

--There ~~was~~ are conventionally available boards each having a heat dissipating structure to cope with heat generation of electronic parts (heat generating parts) mounted as described below. Fig. 9 is a sectional view of a heat dissipating structure of a printed circuit board in which a through hole is formed and a numeral 1 denotes an electronic part, 2 a through hole and 3 a printed circuit board, which is fabricated by forming the through hole 2, on the inner wall of which a conductor is formed, in the printed circuit board 3 at a site where the electronic part 1 is mounted.--

The paragraph beginning at page 2, line 11 has been amended as follows:

--As one of the other examples of heat dissipating structures, there is disclosed a structure which dissipates heat of a part to the rear surface side by way of a high thermal conductivity metal, with a construction formed in a procedure that a through hole in an insulating board at a site where a high heat generating part is mounted is filled with a copper paste and the copper paste is dried and thermally cured to form the high thermal conductivity metal in an embedded state, followed by formation of high thermal conductivity insulating layers on the front and rear surfaces of the insulating board; and further a fabricating method of the structure (see Japanese Unexamined

Patent Publication No. 5-259669 (1993), hereinafter referred to as Patent document 1).--

The paragraph beginning at page 3, line 4 has been amended as follows:

--Then, a structure of Fig. 10 can be fabricated more stably than that of Fig. 9 and a heat dissipating effect is also expected to be greater as compared with the structure of Fig. 9 because of a better heat transfer efficiency, whereas the structure of Fig. 10 is costwise higher as compared with an ordinary printed circuit board because of the use of a more expensive material--~~more expensive~~--

The paragraph beginning at page 3, line 10 has been amended as follows:

--In a structure ~~of~~ such as shown in Patent ~~literature~~ document 1, since the through hole is filled with copper paste as a high thermal conductivity metal, a possibility arises that bubbles occur in the paste as in the structure of Fig. 9, and in addition, there have been other problems that arise that ~~necessities arise for~~ necessitates steps ~~of~~ for forming a high thermal conductivity insulating layer and ~~of~~ for drying and thermal curing in the filling for planarization, which complicates both the structure and process--~~both~~--

The paragraph beginning at page 3, line 19 has been amended as follows:

--It is an object of the present invention to solve the above problems and to provide a heat dissipating structure of a printed circuit board, which is ~~simply and~~ simple, easy, and inexpensive, and has a high heat dissipativity; and to provide a method for fabricating ~~method of~~ the structure.--

The paragraph beginning at page 5, line 25 and ending at page 6, line 5 has been amended as follows:

--With such a structure, heat generated from a heat generating part is transferred by way of a heat dissipating member (and a heat transfer plate) with a high thermal conductivity to as far as a conductor of the GND surface or heat dissipating fins; therefore, a high heat dissipativity can be realized. Not only is fabrication in an ordinary part ~~mounding~~ mounting process enabled, but a step of using a heat resistant tape can also be eliminated by designing shapes of a through hole and a heat dissipating member.--

The paragraph beginning at page 7, line 3 has been amended as follows:

--Fig. 8(a) is an explanatory view of a method of mounting an electronic part in a case where a rear surface of the electronic part is required to be insulated on a heat dissipating structure of a ~~printing~~ printed circuit board according to the present invention and Fig. 8(b) is a schematic diagram of a section after mounting;--

The paragraph beginning at page 7, line 16 and ending at page 8, line 11 has been amended as follows:

--Fig. 1 is an example showing a section of a heat dissipating structure of a printed circuit board according to the present invention on which an electronic part is mounted. Numeral 1 denotes an electronic part assembled by resin molding a semiconductor chip, 2 a through hole, 3 a printed circuit board having a board, made of glass epoxy or one of other insulating materials, and on a surface of which a circuit pattern (not shown) using copper foil or the like is provided, 4 a metal solder such as soft solder and silver paste (an adhesive), and 5 a metal plate (a heat dissipating member) made with copper on

which, for example, there is applied a surface treatment such as a general black oxide treatment (formation of cuprous oxide on a surface) in order to ~~raise an~~ facilitate adhesion with an adhesive. The electronic part 1, the through hole 2 and the metal plate 5 are adhered to one another with the metal solder 4, which is an adhesive. Heat generated from the electronic part 1 is transferred through the metal plate 5 and to as far as the rear surface of the printed circuit board 3 and dissipated into the air. Since conductance of heat is performed through the metal plate 5 made of a material with a thermal conductivity higher than a the board material of the printed circuit board 3, a thermal resistance can be rendered to be extremely low; thereby enabling suppression of rise in temperature of the electronic part 1 to the lowest possible level. Note that shapes of the metal plate 5 and the through hole 2 can be altered into various shapes such as the shape of a rectangle regardless of the shapes shown in the drawing.--

The paragraph beginning at page 8, line 12 has been amended as follows:

--Fig. 2 is an explanatory view of a section of the printed circuit board 3 on which the electronic part 1 shown in Fig. 1 is mounted, and assembled into a device housing 6. Heat of the electronic part 1 is transmitted to the rear surface of the printed circuit board 3 by way of the metal plate 5 with a high thermal conductivity and thereafter, dissipated through the housing 6. In cases except the example of Fig. 2 as well, efficient heat dissipation can be realized by connecting dissipating fins in various shapes to the metal plate 5 of the printed circuit board 3.--

The paragraph beginning at page 9, line 2 has been amended as follows:

--Then, a screen printing process is applied with a soft solder as the metal solder 4, or alternatively, a silver paste is applied to thereby supply the metal solder 4 into a clearance between the through hole 2 and the metal plate 5, and onto the metal plate 5 (Fig. 3(c)). Even if the metal solder 4 intruding into a clearance between the through hole 2 and the metal plate 5 included bubbles, the bubbles would ~~not~~ have no influence on a the thermal resistance since heat is dissipated through the metal plate 5, and the presence of bubbles does not affect reliability either since the bubbles are very small in amount and do not contact directly to an electronic part or the like. Note that a resin paste can replace the metal solder 4.--

The paragraph beginning at page 9, line 13 has been amended as follows:

--Then, the electronic part 1 is mounted onto the metal plate 5 (with omitting mounting of other parts than the electronic part 1). With a solder reflow apparatus, an oven or a hot plate, the metal solder 4 is made molten under a heating condition suitable for the printed circuit board, followed by hardening to connect the electronic part 1, the through hole 2 and the metal plate 5 to one another simultaneously (Fig. 3(d)).--

The paragraph beginning at page 10, line 10 has been amended as follows:

--Fig. 6 (a) is an explanatory view of a method of mounting a bare chip such as a semiconductor (a heat generating part) as a concrete example of mounting an electronic part to a printed circuit board. Fig. 6(b) is a section after mounting. Numeral 21 denotes a conductor circuit layer made of a copper foil, 22 a heat dissipating land layer made of a copper foil, 23 a heat dissipating chip plate (a heat transfer plate) made of a material

with a high thermal conductivity similar to the metal plate 5 made of copper or the like, 24 a bare ~~chip~~ chip, 25 bonding wires and 26 a cap. A series of steps including as far as a mounting step of the heat dissipating chip plate 23 of this method for assembly is realized, in a series of part mounting steps similar to the steps described in Fig. 3, by adhering the heat dissipating chip plate 23 instead of the electronic part 1 onto the metal plate 5 with a solder.--

The paragraph beginning at page 10, line 23 and ending at page 11, line 1 has been amended as follows:

--After mounting the heat dissipating chip plate 23, the bare chip 24 is mounted onto the heat dissipating chip plate 23 with a silver paste or the like, the ~~base~~ bare chip 24 and a conductor circuit 21 is connected by a bonding wire 25 to each other and the cap 26 is attached to the printed circuit board 3, thereby completing mounting of the electronic part.--